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GAS ABSTRACTS

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1. GAS INDUSTRY

Cycling Plant Production

Foster, A. L. CYCLING PLANTS HEADED FOR 4.5 MILLION-GALLON-DAILY CAPACITY. *Oil Gas J.* 46, 64-65, 67-68 (1947) *July* 19.

The author points out that cycling plants produce above 4,000,000 gal/day of liquid products. Such plants rate about one-third of the capacity of natural-gasoline plants. Some highlights of the market problems are related.

J. D. Parent

Gas Pipe Line Production

FPC HAS AUTHORIZED 7,200 MILES GAS PIPE LINE SINCE JULY 1, 1945. *Pipe Line News* 19, 3-5 (1947) *June.*

N. L. Smith, chairman of the Federal Power Commission, in his testimony before the House Committee on Interstate and Foreign Commerce on May 29 stated that the gas shortage of last winter will prevail again this year due to lack of pipe line facilities and increased demand. During the war it was possible to make only the most urgently required additions to facilities and since this time the demand has greatly increased. Line pipe is in unprecedented demand and mills are not prepared to fabricate the quantities of pipe of the large size requested. Only two steel mills roll 26 inch pipe, and only four produce 16 inch or larger sizes. Maximum production is 1,150,000 tons, but the present output is much lower due to a steel shortage. Also, certificates were authorized or requested between January 1, 1947 and April 30, 1947, for 3,000,000 tons. A list of applications pending before the Federal Power Commission shows that requests total 10,177 miles; estimated cost is $854,100,000.

J. D. Parent

LP Gas Industry

Benz, G. R. LIQUEFIED PETROLEUM GAS SUPPLY AND DEMAND OUTLOOK. *Petroleum Refiner* 26, 142, 146, 150, 152 (1947) *June.*

See *Gas Abstracts* 3, 104 (1947) *July* for abstract.

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2. APPLIANCES

Bimetallic Thermal Elements

Hense, H. J. and Kampman, A. A. BIMETALLIC THERMAL ELEMENT STUDY. *Am. Gas Assoc. Monthly* 29, 335-336 (1947) *July-August.*

This article is based on the American Gas Association Research Bulletin 42, "A Study of Bimetallic Thermal Elements." The abstract of this bulletin appears in *Gas Abstracts* 3, 104-105 (1947) *July.*

Neat Gas Burners

Tinbergen, D. NEAT GAS COOKING BURNERS. *Gas J.* (British) 250, 399-400 (1947) *May* 21.

This article is an abstract translation from the Netherland publication "Het Gas" on the proposed use of neat gas burners rather than the bunsen type for cooking burners. The chief objections to aerated burners are the poor turndown and the low efficiency. It is claimed that the neat gas burner will give efficiencies between 55-59% with no soot formation.

E. F. Davis

Space Heating

Leopold, C. S. THE MECHANISM OF HEAT TRANSFER, PANEL COOLING, HEAT STORAGE. *Refrig. Eng.* 54, 33-41, 74, 76 (1947) *July.*

A discussion of various methods of space heating and heat storage along with a report of experimental work in determining the effect of various type luminaire on space heating and accounting for other factors as construction, paint supplementary ventilation and air cooling.

E. F. Davis

Water Heaters

Vixler, L. F. SIZING GAS WATER HEATERS TO MEET AUTOMATIC WASHER REQUIREMENTS. *Am. Gas J.* 167, 11-14 (1947) *July.*

This is a paper presenting some facts regarding the hot water requirements of domestic automatic laundries and the factors to be considered in selecting a water heater for a particular job. Results of some experimental tests are reported.

E. F. Davis

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3. COMBUSTION AND INDUSTRIAL FURNACES

"CC" Burner

Waight, J. F. and Palser, J. FURNACELESS HEATING AND SMALL GAS FURNACES. *Gas J.* (British) 250, 405, 407, 409 (1947) *May* 21.

The concentrated combustion ("CC") burner has found wide application in industrial processes ranging from local heating to steel forging and has replaced the furnace in part or entirely in many instances. Several examples of continuous operation in which the "CC" burner has replaced the furnace or decreased its size include hammer hardening, spanner jaw hardening, automatic pin heating, and automatic tube heating. Many fields to which the "CC" burner may be applicable are open to investigation.

C. Von Fredersdorff

Combustion

A SYMPOSIUM ON COMBUSTION. *Gas J.* (British) 250, 500, 503-504, 509, 511-512 (1947) *June* 4.

Further research in the determination of physical and chemical constants of gas and gaseous reactions is stressed. A general history and present knowledge of slow combustion, burning of solids, emission of radiant energy, chain reactions and heterogeneous combustion are discussed. It is the opinion of the authors that, although a few of the details of the mechanism of combustion can be explained by theory, a complete and accurate analysis of all possible mechanisms is unavailable due to inadequate experimental evidence.

C. Von Fredersdorff

Combustion Calculations

Linden, H. R. and Othmer, D. F. COMBUSTION CALCULATIONS FOR HYDROCARBON FUELS. *Chem. Eng.* 54, 148-153 (1947) *May.*

This paper concludes a discussion on simplified methods of hydrocarbon combustion calculations. (See *Gas Abstracts* 3, 89 (1947) *June.*) Stack losses are readily determined with the aid of nomographs included in the paper. A very convenient method of calculating flame temperature, also with a nomograph, is given. The discussion of flame temperature includes

consideration of the dissociation of combustion products at high temperatures. A number of representative problems and their solutions are included in the paper.

S. Katz

Detection of Furnace Leaks

Sandusky, G. J. COMBUSTION PRODUCTS LEAKAGE. *Gas* 5, 40-42 (1947) *June.*

Methods used in checking furnaces for leakage include direct methods such as the use of an intense light within the furnace and indirect methods such as the use of smoke bombs which utilize the visual sense, aromatics which utilize the olfactory sense, and the use of instruments for gas analysis and fluid flow. A new portable CO_2 indicator used by the Southern California Gas Company and which was first described in the PCGA Proceedings of 1939 is discussed in particular. The principal of the operation of the analyzer is that of the reaction of CO_2 with strontium chloride, the end point of which is indicated by a change of phenolphthalein indicator from reddish to colorless. The number of strokes of an ordinary bicycle pump required (after calibration with air) to effect the color change is a measure of the CO_2 concentration. Directions for preparation and use of the solution are systematically arranged.

C. Von Fredersdorff

Drying Ovens

Grossman, R. B. DRYING OVENS WITH LOW TEMPERATURE RADIANT PANELS. *Ind. Gas* 25, 9-11, 32 (1947) *June.*

Following English developmental work on the application of radiant panels for drying purposes, the Southern California Gas Co., in conjunction with the Automatic Control and Equipment Co., built several successfully operating low temperature radiant heating units for the continuous drying of ceramic dishware on plaster of Paris molds. Rapidity and uniformity of drying and a long mold life are particular advantages gained by the process.

C. Von Fredersdorff

Gas-Fired Glass Melting Tanks

Schwalbe, F. G. LATEST DEVELOPMENTS IN THE USE OF GAS FOR FIRING GLASS MELTING TANKS. *Ind. Heating* 14, 944, 946, 948, 950, 952 (1947) *June.*

Desirable features of gas over liquids as fuel for glass melting tanks and its use with control equipment are described. Designs of the "luminous flame" types utilizing "control air" are stressed for optimum performance.

C. Von Fredersdorff

Gas Turbine Power Plant

Haskin, J. R., Jr. THE MODERN GAS TURBINE IN THE INDUSTRIAL POWER PLANT. *Mech. Eng.* 69, 475-478 (1947) *June.*

Although considerable data on the application of the gas turbine in central-station, marine, and locomotive works have been published, very little information is available on possible use of the turbine in industrial power plants. Assuming turbine and compressor efficiencies, the author compares the gas turbine operation with or without intercooling with a standard steam turbine plant and concludes that for comparable conditions the overall efficiency of a gas turbine plant with 150 psi waste heat boiler is 8 and 13% greater respectively than a 600 psi (51.5% efficiency) and 400 psi (46.5% efficiency) extracting and condensing steam plant. Elementary calculations and plots of heat available, heat rejected and fuel requirements for given turbine inlet temperatures are shown.

C. Von Fredersdorff

Gas Turbine Power Plant

Yellott, J. I. THE GAS TURBINE POWER PLANT—IV. *Power Plant Eng.* 51, 106-110 (1947) *May.*

The author continues his exposition on design of a gas turbine power plant giving consideration to calculations of fuel requirements, determination of correct heating value of fuel at the combustor, fuel to air ratio, and effects of combustor efficiency and water vapor in air. Plots of input vs. efficiency, air temperature vs. excess air and composition of combustion products as well as details of the Westinghouse combustor recommended for the turbine are shown.

C. Von Fredersdorff

Gas Turbine Power Plant

GAS—TURBINE POSSIBILITIES IN THE STATIONARY POWER PLANT FIELD. *Power* **91**, 74-76 (1947) *July.*

The author compares the steam turbine, diesel engine and gas turbine power plants with respect to their ability to meet a variety of heat and power conditions. The gas turbine has interesting possibilities in adapting itself to variable heat to power ratios whereas the heat to power ratio of the diesel and steam turbine are relatively fixed. Various arrangements of the gas turbine for versatile loads are shown and adaptability to the Houdry process and to blast furnaces is described.

C. Von Fredersdorff

Gas Atmospheres for the Metal Industries

Cullen, O. E. WHAT TO LOOK FOR IN THE METAL INDUSTRIES. *Ind. Gas* **25** 15-16, 31, 32 (1947) *June.*

The applications for special gas atmospheres in the metal industries have been directed towards two broad objectives, namely, (1) preventing or minimizing changes in the surface of the metal during heat treating and (2) causing purposeful changes in surface conditions along desired and controlled lines. Recent developments in ferrous metallurgy consist of methods of restoring surface carbon, preventing loss of carbon and dry cyaniding for small machine parts by means of controlled atmospheres. Similar rapid advances in non-ferrous metallurgy are described.

C. Von Fredersdorff

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4. CARBONIZATION AND GASIFICATION

Burning Characteristics of Coal

Harrington, J. DIFFERENCES IN BURNING CHARACTERISTICS OF SIMILAR COALS. *Combustion* **18**, 38-39 (1947) *June.*

This article discusses the variations of burning characteristics of three coals of almost identical size and composition. The greatest variations occurred in the ignition and kindling temperatures of the coal and in the fusion temperatures of the ash. With respect to quality and yields of gas, and by-product yields, the characteristics of the three coals were identical. No explanation is given for the variation in burning characteristics.

G. M. Platz

Carbonization in Vertical Retorts

Weston, F. R. THE MECHANISM OF CARBONIZATION IN CONTINUOUS VERTICAL RETORTS. *Gas World (British)* **126**, 713-719 (1947) *June* 7; *Gas J.* **250**, 556 (1947) *June* 11.

In order to explore the course of the carbonisation in continuous vertical retorts, two such retorts were water quenched from normal operation and later dismantled to permit sampling and study of the contents. Quite a thorough description is given of the conditions found and some tentative conclusions are advanced. The retorts were operating on Durham coal with low rate of steaming making a gas of 500 B.t.u. minimum heating value.

H. R. Batchelder

Weston, F. R. MECHANISM OF CARBONIZATION IN CONTINUOUS VERTICAL RETORTS. II. *Gas J.* (*British*) 250, 730, 735-737 (1947) *June* 25.

The rate of travel and distribution of movement of coal in a continuous vertical carbonizing retort was studied by the insertion of "tallies" through rodding holes. Temperature indications were obtained by multi-metal "tallies" also introduced at the top of the retort. Erratic results obtained are explained partially by an "entrance effect" when introducing the tallies. The structure of the devolatilized coal is discussed in view of the observed movement of the bed.

C. Von Fredersdorff

Coal Blending

Pearson, B.M. AMERICAN BLENDING PRACTICE FOR COKE OVEN PLANT. *Gas Times* (British) 51, 261 (1947) *May* 24.

As many as seven separate blendings are necessary to prepare coal from the Robena mine for conversion into coke to fuel the Pittsburgh district mills of the U. S. Steel Corporation. The separate steps are described by the author.

L. Ciboch

Coal for Coke Manufacture

Russell, C. C. SELECTION OF COALS FOR THE MANUFACTURE OF COKE. *Gas* 23, 75 (1947) *July.*

Data show that for the 87 million tons of coal carbonized in 1945 the average by-product yield per net ton consisted of 10,330 cu. ft. gas, 7.95 gal. tar, 2.84 gal. crude oil and 20.22 lb. ammonium sulfate. Since coke is the main product of carbonization (about 70% by wt.) its quality and yield are usually the main criteria in the selection of the type of coal to be carbonized—by-product yields being of secondary importance. Information on coking properties and yields of some 90 coals has been published by the Bureau of Mines. Various methods for determination of yields from coal are available.

C. Von Fredersdorff

Coal Gasification with Hydrogen

GASIFICATION OF COAL IN HYDROGEN UNDER PRESSURE. *Gas Research Board.* (*British*) 8th Annual Report 1946, 11-18.

A condensed discussion is given of the results of experiments on the gasification of semi-coke and weakly coking coals under hydrogen pressures of about 50 atmospheres. The experiments are directed toward establishment of data for design of commercial plants using this process for the production of town gas. Consideration is to be given to the use of a fluidized instead of fixed bed.

H. R. Batchelder

Coal Sampling

Badger, E. H. M. DEVELOPMENT IN THE THEORY OF COAL SAMPLING. *Gas J.* (British) 251, 34-38 (1947) *July* 2.

This article explains the development of theory of coal sampling as described by B. A. Landry in the Bureau of Mines Bulletin 454 (1944). The author also discusses contributions of many others to the theory of sampling. Comparison of the standard of mixing as determined by Landry against British standards indicates that the larger sizes of coal are undersampled by the British method.

G. M. Platz

Fluidization

Pearson, B. M. FLUIDIZATION OPENS A NEW ERA TO COAL CARBONIZATION AND GASIFICATION—I. *Gas Times* (British) 51, 247-248, 249 (1947) *May* 24.

A rather general article outlining the characteristics and advantages of a fluidized system, and suggesting possible applications and methods of experimental approach.

H. R. Batchelder

Pearson, B.M. FLUIDIZATION OPENS A NEW ERA TO COAL CARBONIZATION—II. *Gas Times* (British) 51, 313-314, 317 (1947) *June* 7.

Equations are developed for the design of vessels for gaseous reactions of solids in the fluidized state. The equations are developed for single vessels in particular and are extended to multiple reaction zones. The experimental data required for the solution of the equations is discussed and a sample problem is illustrated.

C. Von Fredersdorff

Gas Manufacturing

Knight, G. F. GAS MANUFACTURING TRENDS IN NORTH AMERICA. *Am. Gas J.* 167, 37-39 (1947) *July.*

A general discussion, covering gasification of oil in vertical retorts, twin generator high B.t.u. oil gas, and various uses of propane is presented.

H. R. Batchelder

Gas Manufacturing

Powell, A. R. FUTURE GAS MAKING METHODS. *Gas* 23, 75-76 (1947) *July.*

A survey of probably potential future gas making methods. This is a condensation of the paper presented at the American Gas Association Joint Production and Chemical Committee Conference, June, 1947.

H. R. Batchelder

Gas Plant Conversion

Stark, V. EXPERIENCE WITH A GAS PLANT CONVERSION. *Am. Gas J.* 166, 11-13 (1947) *June.*

An account of the changes made in the plant at Claremont, N.H., first toward the more efficient operation of the existing equipment and then to the complete substitution of 900 B.t.u. propane-air for 520 B.t.u. carburetted water gas. Comparisons of operating cost, gas send-out and operating revenue are given for the three periods. An overall change in cost from 21.4 to 11.5 cents per therm was accomplished.

H. R. Batchelder

Gasification with Oxygen

Wright, C. C. and Newman L. L. OXYGEN GASIFICATION OF ANTHRACITE. *Chem. Eng.* 54, 114-115 (1947)*June;* Gas 23, 72 (1947) *July.*

A condensation of the paper given at the American Gas Association Joint Production and Chemical Conference (1947) on the use of rice and barley anthracite in the Wellman-Golusha Producer at Trail, B.C. is given Substantially only the conclusion of the original paper are given, together with some operating results.

H. R. Batchelder

Gum-Formers in Water Gas

Murphy, E. J. THE CONTROL OF GUM-FORMERS IN CARBURETTED WATER GAS. *Am. Gas J.* 166, 22-25 (1947) *June; Gas Age* 100, 33-35,76 (1947) *July* 10.

The most effective control of liquid phase gum formers is oil scrubbing at the plant to remove condensible light oils. A description is given of the scrubbing system being installed at the Brooklyn Union Gas Co. Important secondary

controls are (1) adequate pumping of drips, (2) use of gum filters on appliances and (3) addition of inhibitors such as tertiary butyl catechol to meter diaphragm dressing oils. The author feels that these methods will reduce gum complaints to a minimum.

H. R. Batchelder

Natural Gas Purification

Chapin, W. F. HIGH PURITY NATURAL GAS BY THE GLYCOLAMINE PROCESS. *Petroleum Refiner* **26**, 109-112 (1947) *June.*

Simultaneous use of monoethanolamine and diethylene glycol in aqueous solution—originally used to accomplish both removal of CO_2-H_2S and of water vapor—may be used to advantage where a high degree of purification and no dehydration is required. The glycol permits higher regenerator temperatures at the same pressure and hence more complete stripping. This makes possible treated gas purities not economically feasible with the ethanolamine alone.

H. R. Batchelder

Oils for Carburetting

Kugel, W. F. GAS-MAKING QUALITIES OF OILS. *Am. Gas Assoc. Monthly* **29**, 297-303 (1947) *June.*

A method is described for estimating the enriching value of carburetting oils. The specific gravity and iodine number of the total oil and the specific dispersion of the distillable portion of the oil are used to calculate a factor which is correlated with the results of tube cracking tests in hydrogen atmosphere. Average deviation on 50 samples was less than ±3%.

H. R. Batchelder

Organic Sulfur Removal

REMOVAL OF ORGANIC SULPHUR COMPOUNDS FROM GASES. *Gas Research Board* (British) *8th Annual Report*, **1946**, 27-28, *Gas Times* (British) **51**, 380 (1947) *June* 14.

Using a molybdenum sulfide catalyst for thiophene conversion under varying conditions of temperature and space velocity, tests were made in an attempt to identify catalyst poisions. It was shown that thiophene could be effectively converted to hydrogen sulfide in this manner when present in a hydrogen stream, but some constituent in coal gas rapidly reduced catalyst activity. Other work on the conversion of organic sulfur compounds to hydrogen sulfide prior to H_2S removal by means of hydrolysis with steam over a supported copper-chromium catalyst is described. This latter treatment does not affect H_2S or thiophene, but does reduce other sulfur compounds to 2 to 3 grains per 100 cu. ft.

H. Hakewill

Production of High B.T.U. Gas

Chambers, R. J. TWIN GENERATOR OIL GAS PROCESS FOR PRODUCTION OF HIGH B.T.U. GAS. *Gas Age* **99**, 24-26, 52 (1947) *June* 26; *Am. Gas J.* **167**, 42-45 (1947) *July; Am. Gas Assoc. Monthly* **29**, 323-326 (1947) *July-August.*

A brief description of the high B.t.u. oil gas process used at Buffalo, the set alterations required, and the operating record and results. is given. This paper was presented at the American Gas Association Joint Production and Chemical Conference, N.Y., 1947.

H. R. Batchelder

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Conservation

Bennett, S. P. GAS PRODUCTION AND CONSERVATION IN LOUISIANA. *Oil Gas J.* **46,** 91-92 (1947) *June* 21.

Methods of saving gas in Louisiana are presented.

J. D. Parent

Corrosion

Zajac, T. S. CORROSION—IN HIGH-PRESSURE GAS-CONDENSATE WELLS—GULF COAST AREA. *Oil Gas J.* **45,** 102-105, 107 (1947) *June* 21.

Much has been accomplished on the problem of high pressure gas condensate well corrosion since it was first presented publicly in April 1943; however, the problem is far from being solved. Its importance is illustrated by a 1946 American Petroleum Institute survey of approximately 100 Gulf Coast area fields. There were 46 corrosive fields, 15 noncorrosive and 31 undetermined. Corrosion was caused by increased activity of the carbonic acid or low fatty acids, or both, due to one or more of a multiplicity of variable factors which are listed in this article. The order of severity in corrosion is as follows: christmas tree fittings of condensate wells, producing-string tubing, meter runs and flow lines of wells. The effect of corrosion on casing tubing was mild while on cycling plants and well head equipment of injection wells it was very low. Generally, the severity of corrosion increased as one approached the downstream from the upstream side of the condensate well.

S. Mori

Corrosion

Zajac, T. S. CORROSION IN HIGH-PRESSURE GAS CONDENSATE WELLS. *Oil Gas J.* **46,** 127, 129, 130, 132, 135, 136, 138, 141 (1947) *June* 28.

The corrosion prevention program consists of two phases. First, the corrosion detection program in which christmas tree inspections and tubing caliper surveys are used as long term interval indicators, while exposure coupons and amounts of iron, organic acids and other constituents are used as instantaneous indicators showing the progressive effect of an inhibitor. At present there is no mechanical method of measuring corrosion in the casing tubing. In the second phase or the corrosion alleviation program, investigations involve around chemical inhibitors (both organic and inorganic substances) and plastic and resistant metallic alloy linings and fittings for the christmas tree fitting, tubing, and casing. At present each alleviation case is only for a specific case and there is no one method of corrosion control that has a universal application; therefore, the problem is far from being solved at present.

S. Mori

Cycling Plant

Love, F. H. CYCLING PLANT INCLUDES INNOVATIONS. *Petroleum Engr.* **18,** 41-46 (1947) *June.*

A flow sheet and equipment and process details are given for a plant designed for 55 MMcf/day. 100% of pentanes plus and 80% of the butanes are to be extracted. Present products are 98% propane, 18 lb. RVP gasoline, kerosine and commercial butane.

J. D. Parent

Gas-Processing

Tuttle, R. B. GAS-PROCESSING PLANT MAINTAINS STABILITY AT 150% THROUGHPUT. *Oil Gas J.* **46,** 86-87, 89 (1947) *July* 5.

Northern Natural Gas Co.'s wet gas processing unit near Sublette, Kansas has proved to be very flexible handling 50% increase in throughput over the design valve with little alteration in performance.

J. D. Parent

Handling Peak Loads

Hall, E. L. METHODS OF HANDLING PEAK LOADS. *Gas Age* **100**, 27-28, 32 (1947) *July* 10.

The author traces the development of the factors that make the present peak load problem so acute and discusses the possible methods of meeting this problem. These include: increased production from coke ovens by variations in operating methods; use of premium fuel and oil in carburetted water gas sets during peak periods; general survey of plant conditions to eliminate limitations on capacity where possible; production of high B.t.u. gas; use of LP gas—air mixtures; storage of natural gas under pressure, as liquid, as hydrate or underground; and the non-catalytic or catalytic reforming of light hydrocarbons.

H. R. Batchelder

LP Gas

Cook, M. LIQUEFIED PETROLEUM GAS—ALLY OF THE GAS INDUSTRY. *Gas* **23**, 37-41 (1947) *July*.

Uses are suggested for LP gases as an aid to utilities companies. (1) LP gas for peak shaving, (2) LP gas for cold enriching, and (3) for reforming. Comparative economies of peak load systems are discussed and the figures given indicate a balance in favor of LP gas over new generation facilities. The absolute need for adequate storage is stressed. Use of bottled gas to reserve future potential city gas markets is discussed.

H. R. Batchelder

Laying the "Biggest Inch"

Laulhere, B. M. LAYING THE "BIGGEST INCH" LINE. *Gas* **23**, 25-28 (1947) *July*.

Some unusual problems encountered and the methods used to circumvent difficulties are related.

J. D. Parent

Pipe Line Construction

Reed, P. CONSTRUCTION METHODS FOLLOWED IN LAYING EL PASO NATURAL'S 740-MILE, 26-IN. TEXAS-CALIFORNIA LINE. *Oil Gas J.* **46**, 60-61, 63-64 (1947) *July* 12.

Construction methods used by the El Paso Natural Gas Co. in laying its part of the Texas-California line are related.

J. D. Parent

Pressure Maintenance

Short, E. H., Jr. PRESSURE MAINTENANCE PROJECT SETS PATTERN FOR FUTURE PROGRAMS OF ITS KIND. *Oil Gas J.* **46**, 79-80 (1947) *July* 5.

A plant flow sheet is shown. Automatic control is a feature of the design.

J. D. Parent

Sand Consolidation

Wrightsman, G. G. and Spain, H. H. CONSOLIDATION OF SANDS IN OIL AND GAS WELLS. *Oil Gas J.* **46**, 73, 84, 86, 88 (1947) *July* 19.

Certain sands of the Gulf Coast area are too loosely consolidated for normal production. The authors propose treating such sand with a resin for the purposes of consolidation.

J. D. Parent

Underground Storage

Sterne, W. P. STORING LIQUEFIED GASES IN DEPLETED OIL RESERVOIRS. *Oil Weekly* **126**, 65-66 (1947) *June* 30.

Through use of depleted oil reservoirs, the Carter Oil Company is able to store underground in excess of one million barrels of liquefied petroleum gases. Underground storage eliminates problems and hazards of aboveground storage and has resulted in material savings in construction costs and reduction of waste. During summer months the company introduces the liquefied gases through input wells into the subterranean storage reservoirs. As cold weather arrives the gases are taken from this reserve which insures customers of continuous supplies.

Author's abstract

Well Completion with Mud Fluid

Radford, H. E. SELECTION OF MUD FLUID FOR COMPLETION OF WELLS. *Petroleum Engr.* **18**, 72, 75, 78 (1947) *June.*

A review is given of previous reports and new evidence is provided to show that damage to the productive formation does occur due to action of clay-water mud on sands as drilling proceeds. Field evidence is presented to show that use of special muds tends to reduce the amount of damage done. The principal objective in selecting a drilling mud for completion work in a given well is to obtain the maximum productivity for that well. Each of the several special muds available have certain exclusive advantages that may result in their selection for a particular completion job. An effort has been made in this paper to point out characteristic advantages of these muds and to give examples of their use under appropriate circumstances. Where the problem is only to prevent damage to the sand by infiltration of water it can best be solved by use of oil base mud. Where other related problems exist, as for example the presence of long sections of open hole, or where there is need for a water base electric log, or for a study of ditch shows, one of the special water base muds will be most desirable.

Author's abstract

The following articles, which have not been abstracted, are called to your attention:

Binckley, N. J. UNUSUAL CONSTRUCTION FEATURES OF THE 30" GAS TRANSMISSION PIPELINE FROM THE COLORADO RIVER, NEAR BLYTHE, TO SANTA FE SPRINGS, CALIFORNIA. *Calif. Oil World* **40**, 3, 5, 7, 9, 56 (1947) *June*, 2d issue.

Smith, C. J. CHARLESTON PLANT USES PROPANE-AIR FOR PEAK SHAVING. *Gas Age* **99** 18 (1947) *June* 26.

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6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Analysis of Fischer-Tropsch Gases

D'Ouville, E. L. and Howe, K. E. THE USE OF THERMAL CONDUCTIVITY CELLS FOR GAS ANALYSIS IN STUDYING THE FISCHER-TROPSCH SYNTHESIS OF HYDROCARBONS. *Petroleum Refiner* **26**, 98-103 (1947) *June.*

A method is described for the analysis of "Synthesis Gas" and "Product Gas" from a Fischer-Tropsch unit. A single thermal conductivity cell unit is used for binary mixtures and for other mixtures than can be so considered. For complex mixtures of as many as five components a multiple cell unit is described. A complete description of the cells, auxiliary equipment, and technique is given. The advantages and limitations of the method are discussed with special reference to Fischer-Tropsch gases. In some cases the results are compared with those of the conventional "Orsat" technique.

Authors' abstract

Propane-Carbon Monoxide Reaction

Pines, H. and Ipatieff, V. N. REACTION OF PROPANE WITH CARBON MONOXIDE IN THE PRESENCE OF ALUMINUM CHLORIDE. *J. Am. Chem. Soc.* **69**, 1337-1339 (1947) *June.*

Propane was made to react with carbon monoxide at 80-125 atmospheres pressure in the presence of an aluminum chloride-hydrogen chloride catalyst. The reaction products were isobutyric acid, isobutyl isobutyrate and 2, 5-dimethyl-4-hexen-3-one; the yields were 5, 44 and 23 mole percent, respectively, based on carbon monoxide reacted. A reaction mechanism based on the primary formation of isobutyraldehyde is proposed.

C. H. Riesz

Separation of Hydrocarbons

Ruhemann, M. THE SEPARATION OF OIL GASES. *Chem & Industry* (British) **25**, 347-350 (1947) *June* 21.

This is a general discussion of the various methods available for separation of the components of mixture of light hydrocarbons, and the factors which affect the choice of the proper method. These are considered from the standpoint of English economic conditions.

H. R. Batchelder

Spectroscopic Analysis of Hydrocarbons

Heigl, J. J., Bell, M. F., and White, J. V. APPLICATIONS OF INFRARED SPECTROSCOPY TO THE ANALYSIS OF LIQUID HYDROCARBONS. *Anal. Chem.* **5**, 293-298, (1947) *May.*

A modification of standard infrared spectroscopy practice applicable to hydrocarbon analysis is described. Using the "base-line" technique, rapidity of operation without loss of accuracy is achieved by the elimination of the reference cell. Instead of the conventional optical density, a base-line optical density, D_B is used, which is defined by

$$D_B = \log I_B/I$$

where I is the height of the absorption maximum, and I_B is the height of the "base-line," an average value for the intensity of the radiant energy before absorption. A preliminary qualitative spectroscopic analysis is used to identify the components, after which the usual procedure is followed with the assumption of the additivity of the base-line optical densities. In synthetic mixtures of six and seven octanes, maximum deviations of 2% were obtained.

S. Katz

Sulfur Determination

Hagerman, D.B. DETERMINATION OF SULFUR BY COMBUSTION IN A VERTICAL TUBE. *Anal. Chem.* **19**, 381-383 (1947) *June.*

A new method claimed to combine simplicity, rapidity, and accuracy for determining sulfur in organic liquids is described. Full details regarding the analytical procedure and construc-

tion of required apparatus are given. Briefly, the method consists of alkalimetrically determing sulfur compounds resulting from combustion of sample in a packed stainless steel tube maintained at 1525°F. This method is particularly suited to the determination of sulfur in oils of low volatility, and data demonstrating the high degree of reproducibility and accuracy attained in such analyses are included.

H. Hakewill

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7. ANALYTICAL METHODS AND TESTS

Analysis by Mass Spectrometry

Johnson, S. E. J. NEW METHODS OF ANALYSIS BY MASS SPECTROMETRY. *Anal. Chem.* 19, 305-306 (1947) *May.*

A method of analysis with the mass spectrometer is proposed in which ratios of ion current peaks are used throughout. The method appears to be especially applicable to binary systems in the absence of very low selective concentration. The procedure does not apply too well to multicomponent systems though examples are given for handling them. It should be noted that the usual vapor pressure measurements of the system are not necessary.

S. Katz

Automatic Microdetermination

Clark, R. O. and Stillson, G. H. AUTOMATIC MICRODETERMINATION OF CARBON AND HYDROGEN. *Anal. Chem.* 19, 423-426 (1947) *June.*

The construction and operation of a semiautomatic apparatus for determining carbon and hydrogen on a micro scale and the procedure employed for the combustion of various types of samples are explained. A background of experimental data are presented comparing the results obtained by the new semiautomatic procedure with analyses made manually and with older automatic methods. The semiautomatic unit developed is readily adapted to fully automatic operation that is well-suited for routine use.

H. Hakewill

Carbon and Hydrogen Determination

Simmons, M. C. DETERMINATION OF CARBON AND HYDROGEN IN PETROLEUM DISTILLATES. *Anal. LChem.* L19, L385-389 (1947) *June.*

The author describes a technique in which a lamp is used in conjunction with a combustion furnace for the simultaneous determination of carbon and hydrogen in volatile petroleum products. Repeated analyses of pure organic compounds yielded values having a precision of $\pm 0.013\%$ and better for both carbon and hydrogen; the maximum deviation from theoretical quantities did not exceed 0.030% in either case. This procedure is advantageous in that it permits accurate determinations to be made rapidly on relatively small samples of volatile liquids.

H. Hakewill

Mercaptan Removal

LINDE COPPER SWEETENING PROCESS. *Petroleum Refiner* 26, 134-136 (1947) *June.*

Doctor sweet gasolines, solvents, kerosines, and distillates are produced from materials containing mercaptans by treatment with copper chloride and oxygen. Hydrogen sulphide is first removed by the conventional caustic wash which is followed by treatment with a mixture

of copper chloride and an inert clay in a hydrocarbon slurry. Pure oxygen is added continuously for the regeneration of the copper chloride. Oxygen consumption amounts to approximately 0.10 cubic foot per barrel of stock for each 0.01% of mercaptan sulfur. The chief advantages claimed for the process are: (1) Low investment and operating costs, (2) No sulfur corrosion problem, (3) No material losses due to sludge formation or evaporation, and (4) Small chemical consumption.

H. Hakewill

Semi-Infrared Analysis

Seyfried, W. D. and Hastings, S. H. SHORT-CUT METHODS OF INFRARED ANALYSIS. *Anal. Chem.* 19. 298-304 (1947) *May.*

The usual methods of infrared analysis may sometimes be modified with a considerable saving of time by the judicious combination of conventional procedures with semi-infrared methods. In the present paper, the base-line method of analysis in which the absorption peak is referred to its adjacent minimum is described. Empirical methods of single point analysis for substances which do not obey Beer's law are also described, as well as the companion standard method in which the unknown is compared directly with reference samples of known composition.

S. Katz

Spectrophotometric Absorption Cells

Kirk, P. L., Rosenfels, R. S., and Hanahan, D. J. CAPILLARY ABSORPTION CELLS IN SPECTROPHOTOMETRY. *Anal. Chem.* 19, 355-357 (1947) *May.*

In most colorimetric processes, the absorption cell is considerably larger in diameter than the light beam and much of the colored component is not used effectively. In the present paper, a liquid cell is described in which the base is of capillary dimensions. With these cells, volumes as low as 0.2 ml. may be used in 2 cm. liquid columns. Analytical data obtained with these cells and in the cells of conventional size were in excellent agreement.

S. Katz

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8. GENERAL AND PHYSICAL CHEMISTRY

Thermodynamic Calculations

Edmister, W. C. and McGarry, R. J. THERMODYNAMICS OF GAS-LIFT OIL PRODUCTION. *Oil Weekly* 126, 61-62 (1947) *June* 30.

An empirical expression has been developed from experience for calculating the quantity of gas required to lift a given amount of oil. This expression is based on the use of an efficiency equal to the fraction depth that the oil will rise in the flowing pipe under the bottom-hole pressure, or the submergence fraction. This efficiency, which is applied to the isothermal work of expansion of the gas and the straight lift or minimum work for the oil, covers friction and all other energy changes. This empirical method is limited to the pipe size found by experience to be optimum for the quantity of oil to be lifted. Pipe size is not a variable covered by this empirical method.

Excerpt from article

10. CHEMICAL ENGINEERING

Cracking Catalyst Size Analysis

Webb, G. M. PARTICLE SIZE DISTRIBUTION OF CRACKING CATALYSTS. *Petroleum Processing* 2, 497-498, 500-502 (1947) *July.*

Mechanical screening and sedimentation in liquid media were used for size analysis of a catalyst. Quite good agreement was obtained. The moisture content of the solids was found to be important in dry screening; electrification results and particles do not pass through the screen openings properly if the moisture content is too low. The peptizing properties of the liquid are very important in the sedimentation method. There is some uncertainty as to the proper value of the density to be used in the application of Stoke's law to porous particles.

J. D. Parent

Dehydration

Hall, A. G. and Bayer, A. R. MECHANICAL DEHYDRATION. *Gas* 23, 72, 75 (1947) *July.*

An account of the centrifugal separation of water from tar emulsions in use at the plant of the Brooklyn Union Gas Co. with good results is given. Capacities up to 800 gal. of dry tar per hour are available. The product contains all of its light oil, and viscosities are not increased, because of the absence of heat treatment.

H. R. Batchelder

Distillation of Natural Gasoline

Lockhart, F. J. MULTI-COLUMN DISTILLATION OF NATURAL GASOLINE. *Calif. Oil World* 40, 11, 13, 15, 17, (1947) *June,* 2d issue.

This article is a discussion of the choice of the sequence of distilling operations in recovering three or more products from the distillation of natural gasoline.

H. R. Batchelder

Distillation Symposium

The following papers were presented at the 13th Annual Chemical Engineering Symposium of the Division of Industrial and Engineering Chemistry of the American Chemical Society at the Mellon Institute, Pittsburgh, December 30-31, 1946.

Hickman, K. C. D. COMMERCIAL MOLECULAR DISTILLATION. *Ind. Eng. Chem.* 39, 686-694 (1947) *June.*

A description of the development and of the present equipment for molecular distillation at rates up to 250 gallons per hour of high-boiling oils and heavy chemicals which would not tolerate the temperatures required in ordinary distillation is given. Utilities requirements per unit of product are given for the distillation of some typical materials, without much detail.

H. R. Batchelder

Buell, C. K. and Boatright, R. G. FURFURAL EXTRACTIVE DISTILLATION FOR SEPARATION AND PURIFICATION OF C_4 HYDROCARBONS. *Ind. Eng. Chem.* 39, 695-705 (1947) *June.*

The furfural extractive distillation process for the separation and purification of C_4 hydrocarbons is used extensively in butadiene manufacturing processes in connection with the government synthetic rubber program. Furfural, as a selective solvent, alters the normal relative volatilities and makes possible the separation of several of the C_4 hydrocarbons which would be difficult, if not impossible, to separate by simple fractional distillation. This paper

presents information relative to the development and commercial operation of this process. Solvent characteristics are discussed, a commercial process flow arrangement is described, performance data are presented, and the effects of operating variables with respect to selection of process control methods and degree of separations obtained are discussed. Factors pertaining to selection of materials of construction and equpment items and their performance characteristics during more than three years of plant operations are reviewed.

Author's abstract

Willingham, C. B., Sedlak, V. A., and Rossini, F. D. ROTARY CONCENTRIC-TUBE DISTILLING COLUMN. *Ind. Eng. Chem.* **39**, 706-712 (1947) *June.*

The development and present form of the laboratory distillation column with a rotating center element developed at the Bureau of Standards are described. Relationships are given for throughput, rotation speed, fractionating efficiency and pressure drop.

H. R. Batchelder

McMahon, H. O. EFFICIENT PACKING FOR RECTIFYING COLUMNS. *Ind. Eng. Chem.* **39**, 712-714 (1947) *June.*

A new rectifying column packing material is described. The material is characterized by high throughput and excellent contacting ability. It is light in weight and relatively easy to manufacture. One cubic foot of the material weighs approximately 25 pounds and contains about 450,000 pieces of packing. The unit of packing is made from a quarter-inch square of 100-mesh wire cloth formed into a saddle-like shape. The material has been rather extensively used for the fractionation of liquid air in some oxygen plants built for the armed forces.

Author's abstract

Forsythe, W. L., Jr., Stack, T. C., Wolf, J. E., and Conn, A. L. PERFORMANCE OF McMAHON PACKING. *Ind. Eng. Chem.* **39**, 714-718 (1947) *June.*

This paper discusses the performance of the McMahon packing described in the preceding abstract. Compared to Stedman packing, McMahon's shows a lower fractionating efficiency, but lower pressure drop, which is an advantage in vacuum fractionating. Maximum capacity and liquid holdup are about the same for the two packings. The McMahon packing is more widely applicable, is more easily installed and removed.

H. R. Batchelder

Melpolder, F. W. and Headington, C. E. CALCULATION OF RELATIVE VOLATILITY FROM BOILING POINTS. *Ind. Eng. Chem.* **39**, 763-766 (1947) *June.*

An improved method is described for calculating the ideal relative volatility of nonpolar binary mixtures from the boiling points of the components. Based on recent precise vapor pressure data, the value of alpha was correlated with temperature and pressure over a range of 300°C. and at pressures down to 10 mm. of mercury. In order to facilitate the solution of distillation problems, a graphical solution of Fenske's total reflux equation for binary mixtures is given.

Author's abstract

Aston, J. G., Lobo, W. E. and Williams, B. LIQUID AIR FRACTIONATION. *Ind. Eng. Chem.* **39**, 718-731 (1947) *June.*

Bowman, J. R. and Briant, R. C. THEORY OF THE PERFORMANCE OF PACKED RECTIFYING COLUMNS. *Ind. Eng. Chem.* **39**, 745-751 (1947) *June.*

Griswold, J. and Stewart, P. B. RECTIFICATION OF BENZENE-TOLUENE. EFFECT OF OPERATING VARIABLES ON PLATE EFFICIENCY. *Ind. Eng. Chem.* **39**, 752-762 (1947) *June.*

Fractional Distillation

Starr, C. E., Jr., Anderson, J. S. and Davidson, D. M. LABORATORY LOW-TEMPERATURE FRACTIONAL DISTILLATION. *Anal. Chem.* 19, 409-412 (1947) *June.*

A study has been made of low-temperature fractional distillation using higher charging and distillation rates than those ordinarily employed. The analysis by mass spectrometer of overhead samples to determine the amount of contamination with higher boiling point constituents indicates that charging rates much higher than those usually used result in equal accuracy and considerable economy of time. For special applications, the rate of distillation may also be increased with no loss in accuracy Tables of data obtained from this study are given.

M. Nolt

Fractional Distillation and Absorption

Edmister, W. C. HYDROCARBON ABSORPTION AND FRACTIONATION PROCESS DESIGN METHODS, *Petroleum Engr.* 18, 57, 60, 62, 64, 66, 68, 70 (1947) *June.*

Terms and concepts commonly employed in absorption and fractional distillation are explained in this article which is the second of a series of three.

J. D. Parent

Drying Units

Amero, R. C., Moore, J. W. and Capell, R. G. DESIGN AND USE OF ADSORPTIVE DRYING UNITS. *Chem. Eng. Progress* 43, 349-370 (1947) *July.*

Characteristics of florite dessicant, comparison of drying processes and certain design data such as pressure drops in granular beds are presented.

J. D. Parent

Heat Flow

Kayan, C. F. EFFECT OF FLOOR SLAB ON BUILDING STRUCTURE TEMPERATURES AND HEAT FLOW. *Heating, Piping, Air Conditioning*, 19, 103-111 (1947) *June.*

Complex heat flow paths are to be found in building structures in a wide variety of forms and arrangement. Under such circumstances it is difficult, and generally impractical, to calculate steady-state heat flow and surface temperature distribution by orthodox mathematical or graphical techniques, particularly when surface conductances are involved on the high and low temperature sides. This paper presents isotherms for different cases of building structure heat flow. A description is given of apparatus and an experimental method for predetermining heat flow by means of electrical analogy.

Author's Abstract

Heat Transfer

Arthur J. R. and Linnett, J. W. THE INTERCHANGE OF HEAT BETWEEN A GAS STREAM AND SOLID GRANULES. PART I. *J. Chem. Soc.* (British) 1947, 416-424 (*March*)

The temperature distribution was studied in a heated bed of charcoal granules through which air was passing. The granules were packed in a vertical cylindrical column whose walls were kept at a constant temperature. Heat was supplied at a given layer by an electrical heater embedded in the charcoal; and the temperature was correlated with the distance from the heater. The authors' results show that the temperature-distance relationship is dependent

on the air flow rate but independent of the heating rate. The shape of the temperature distribution across the column at a given depth was found to be independent of the air flow rate. The authors account for their experimental results by a mathematical treatment of the problem. They conclude that the air temperature was very close to the charcoal temperature throughout the column, and that the rate of interchange of heat between the air and granules was rapid compared with the conduction of heat through the charcoal.

W. M. Dow

Heat Transfer

Brinkley, S. R., Jr. HEAT TRANSFER BETWEEN A FLUID AND A POROUS SOLID GENERATING HEAT. *J. Applied Phys.* 18, 582-585 (1947) *June.*

The theory, due to Anzelius, of the transfer of heat between a fluid flowing with constant velocity through a porous solid is extended to include the case where the solid generates heat. Expressions are obtained for the temperatures of solid and fluid as functions of position and time, it being assumed that the heat source function is a linear function of the temperature of the solid with coefficients independent of position and time. The application of the theory to a description of the temperature in catalytic reactions is indicated.

Author's abstract

Heat Transfer

Iluchin, N. V. INVESTIGATION OF HEAT TRANSFER AND FRICTION LOSS FOR STEADY FLOW AT ULTRA-HIGH VELOCITIES. *Engrs. Digest* 4, 213-219 (1947) *May.*

The author develops theoretical relationships for the computation of heat exchange and flow resistance in the case of the flow of gases through smooth tubes. He also presents the results of an experimental investigation which he conducted to verify his theoretical relationships. The theoretical development is based on the assumption that similarity exists between the temperature and velocity fields (Prandtl number equal to unity). The author also assumes that the velocity distribution curve prevailing under conditions of adiabatic flow is unchanged in the presence of heat transfer. Experiments were conducted with two tubes with different ratios of length to diameter. Hot flue gases were passed through the tubes which were cooled with water. The author presents his results as a correlation of the Nusselt number, the Peclet number and the ratio of the mean temperature to the wall temperature. His empirical correlation agrees with his theoretical correlation with a maximum discrepancy of 3%. He concludes that the length to diameter ratio does not affect the coefficient of heat transfer.

W. M. Dow

Editor's Note: This article originally appeared in *Izvestia Akademii Nauk USSR* (1946) 703-718.

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11. PROCESS EQUIPMENT AND INSTRUMENTATION

Heat Pump

Goethe, S. P. THE HEAT PUMP—THE CHOICE AND COST OF VARIOUS SYSTEMS. *Refrig. Eng.* 54, 24-28, 70, 72 (1947) *July.*

A discussion of six different systems operating as heat pumps in northern Florida is given. Flow diagrams and performance curves are shown. Interesting yearly owning costs for each system are given along with operating data from several pumps.

E. F. Davis

Heat Pump

HEAT PUMP CYCLE USING A GROUND COIL. *Heating, Piping & Air Conditioning* **19,** 92-93 (1947) *June.*

The Armour Research Foundation of Illinois Institute of Technology has been studying the possibility of using energy stored in the ground as a source of heat supply for small units designed for residential heating and cooling. The earth is particularly suited because it serves as a stable heat source universally available and not appreciably affected by sudden variations in local weather conditions. This article is a report of the paper presented by R. A. Budenholzer at the 1947 Midwest Power Conference held at the Palmer House in Chicago, March 31, April 1-2.

H. T. Inatomi

Pipe Supports

Stothart, E. W. IMPORTANCE OF FLEXIBLE PIPE SUPPORTS. *Petroleum Processing* **2,** 529, 532-533 (1947) *July; Petroleum Refiner* **26,** 118-120 (1947) *July.*

Transfer of weight in pipe hangers caused by thermal expansion of the piping at the high temperatures at which furnaces are operated today provides an important factor to be considered in the design and selection of supports. Equations are presented for calculating the additional stress caused by weight transfer. The importance is noted to the erecting and operating engineers of their being supplied by the design engineers of accurate and detailed specifications of proposed supporting systems for piping.

Author's abstract

Pulverizers

DEVELOPMENTS IN PULVERIZER DESIGN. *Power Plant Eng.* **51.** 101 (1947) *July.*

A brief description of construction and operation of the two types of Blaw-Knox fuel pulverizers is given. Superheated steam is used as the pulverizing medium, pulverization being accomplished by high velocity impact expansion of the fuel. Approximately 10,000 lb. of fuel can be handled per hour using approximately .06 lb. of steam per pound of fuel pulverized. Pulverization is 90% through a 200 mesh screen.

G. M. Platz

Station Meters

Spinks, W. L. S. and Mason, A. E. ASPECTS OF GAS MEASUREMENT. *Gas J.* (British) **250,** 665-669, 671-674, 679, 680 (1947) *June* 18; *Gas World* (British) **126,** 764-769 (1947) *June* 14.

The characteristics of various types of station meters are presented.

J. D. Parent

Valves

Pool, E. B. PRESSURE LOSSES IN VALVES. *Heating, Piping & Air Conditioning.* **19,** 74-77 (1947) *June.*

Pressure losses in valves represent wastage of large sums of money. This article describes the development of a method of testing and analysis which will permit accurate prediction of pressure losses. These data will facilitate design of valves.

H. T. Inatomi

12. MATERIALS OF CONSTRUCTION

Cathodic Protection

James, J. R. and Featherly, R. L. CATHODIC PROTECTION OF STEEL TANK BOTTOMS BY THE USE OF MAGNESIUM ANODES. *Petroleum Technol.* 10, *T. P.* 2202 (1947) *May.*

Installation of a cathodic protection using magnesium anodes reduced an annual cost of replacing corroded oil storage tank bottoms to 1%. This figure does not include the value of lost product nor time allowed due to the tank being out of service. These data were obtained from one of the four storage tanks which were installed with the cathodic protection. Two tanks were of 55,000 bbl. capacities and two more were of 20,000 bbl. capacities. By insulating the tank from the soil and also from its connecting pipelines, the magnesium anode may be made to last longer and less current was necessary to maintain the cathodic protection. The manner of installing the magnesium anodes is briefly described in this article.

S. Mori

Chimney Liner Corrosion

Johnson, G. B. CHIMNEY LINER CORROSION RESULTING FROM GAS-FIRED FURNACES. *Gas Age* 100, 29-32, 72 (1947) *July* 10.

A survey on chimney liner corrosion, carried out by the Minneapolis Gas Light Co. since 1925, revealed that a 25½ hard aluminum liner would last indefinitely. Wilder metal coated with an asphalt chromate emulsion held up while the coating was intact. Results from glazed sewer tile and steel liner coated with a plastic material were both disappointing. Even the aluminum liner was subject to corsion under one or more of the following conditions: (1) high sulfur content in flue gas accompanied by a low stack temperature, (2) other gases, such as incinerator gas, passing through the chimmney, (3) boiler scale impinging on the chimmney liners. For the best liner performances this author recommends a stack temperature of 400°F. or over (over 450°F. under poor draft conditions), boilers be kept clean of scale, andonly flue gasses be passed through the chimney.

S. Mori

Corrosion

Rohrman, F. A. THE ECONOMIC ASPECTS OF CORROSION. *Petroleum Refiner* 26, 85-90 (1947) *June.*

Many factors which contribute to the final cost of corrosion in the chemical and allied industries are listed and elaborated on to show that most estimates made previously are underrated. Tendencies for different metals to corrode can be obtained from calculations using an electrochemical series table and Nernst equation; however, in an acid medium where the hydrogen is evolved, another factor, called the overvoltage of hydrogen on the metal, must

stances in form of a lower hydrogen overvoltage metal or oxygen dissolved in the acid will increase corrosion reaction; however, on some metals, excess oxygen may promote formation of an oxide film which will retard reactions. The relative electrochemical or hydrogen overvoltage positions of metals concerned have nothing to do with the speed of reaction but merely give a tendency to corrode.

S. Mori

New constructions for 900° to 1000°F. steam-power piping systems are now using chromium molybdenum steels to almost the exclusion of others such as carbon molybdenum steel. Metallurgical study of carbon molybdenum pipe rupture established that a zone of segregated graphite had developed in one instance. This article is a report of the paper presented by J. J. Kanter at the 1947 Midwest Power Conference held in Chicago March 31, April 1-2.

H. T. Inatomi

Corrosion Resistant Valves

Koch, A. J. DIAPHRAGM CONTROL VALVES. *Chem. Eng.* 54, 207-208, 210, 212, 214, 216, 218 (1947) *June.*

The article is a general discussion of diaphragm control valves, particularly with reference to construction materials and designs for corrosive and high temperature service in the chemical industries. Valves for handling of corrosive gases and acids are considered also. References giving detailed control valve information are listed.

H. T. Inatomi

Insulation for Heated Kettles

INSULATION TECHNIQUE FOR A DOWTHERM-FIRED SYNTHETIC RESIN KETTLE. *Ind. Gas* 25, 13-14 (1947) *June.*

An advantageous method of insulating heated kettles using block mineral wool coated with a mixture of mineral wool cement and regular Portland cement is described.

C. Von Fredersdorff

High Temperature Piping

MATERIALS FOR HIGH TEMPERATURE PIPING. *Heating, Piping & Air Conditioning* 19, 90-91 (1947) *June.*

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